

CLAIMS

1. A lithographic projection apparatus comprising:
a radiation system that provides a projection beam of radiation;
a support structure that supports patterning structure, the patterning structure serving to
pattern the projection beam;
5 a substrate table constructed to support a substrate; and
a projection system that projects the patterned beam onto a target portion of the
substrate; and
a particle shield that generates an electromagnetic field so as to prevent particles from
becoming incident on an object to be shielded.

10 2. An apparatus according to Claim 1, wherein said particle shield is configured and
arranged so as to deflect particles approaching the object to be shielded.

15 3. An apparatus according to Claim 1, wherein said particle shield comprises an electric
field.

4. An apparatus according to Claim 3, wherein said particle shield is adapted to generate said
electric field in the vicinity of said object to be shielded.

20 5. Apparatus according to Claim 1, wherein said particle shield is adapted to generate a non-
uniform electric field.

25 6. Apparatus according to Claim 5, wherein said particle shield comprises an elongate
charged member.

7. Apparatus according to Claim 1, wherein said particle shield is adapted to generate a
substantially uniform electric field.

30 8. Apparatus according to Claim 7, wherein said particle shield comprises a pair of
conductive plates arranged substantially parallel to each other on either side of a region adjacent

said object to be shielded and means for establishing a potential difference between said pair of conductive plates.

9. Apparatus according to Claim 1, wherein said particle shield comprises a grid or an array of electrodes.

10. Apparatus according to Claim 9, wherein said grid or array is arranged substantially parallel to a surface to be shielded of said object to be shielded.

11. Apparatus according to Claim 1, wherein said particle shield comprises an electrostatic getterer plate and means for charging said electrostatic getterer plate to a potential so as to generate an electric field to attract particles.

12. Apparatus according to Claim 1, wherein said particle shield is configured and arranged to transport particles out of a space within said apparatus.

13. Apparatus according to Claim 1, wherein said particle shield includes at least one particle trap, said particle trap comprising a recess in a surface, said recess being shaped so that it is easier for a particle to enter said recess than to exit said recess.

14. Apparatus according to Claim 1, wherein said particle shield comprises a radiation source arranged to generate a beam of radiation.

15. Apparatus according to Claim 14, wherein said radiation source is adapted to generate an electromagnetic beam effective as an optical breeze to deflect particles by momentum transfer.

16. Apparatus according to Claim 14, wherein said radiation source is adapted to generate a beam of radiation capable of ionizing particles.

17. Apparatus according to Claim 1, wherein said particle shield comprises means for charging said object to be shielded to a bias potential relative to its surroundings.

18. Apparatus according to Claim 1, wherein said support structure comprises a mask table for holding a mask.

19. Apparatus according to Claim 18, wherein said object to be shielded is a mask held on said mask table.

20. Apparatus according to any one of Claim 1, wherein said object to be shielded is a mirror or other element disposed in the illumination or projection systems.

21. Apparatus according to Claim 18, further comprising a mask handling part for transferring said mask to said mask table, and wherein said mask handling part comprises said particle shield for shielding said mask.

22. Apparatus according to Claim 1, further comprising a substrate handling part for transferring said substrate to said substrate table, and wherein said substrate handling part comprises said particle shield for shielding said substrate.

23. A device manufacturing method with an illumination system and projection system, comprising the steps of:

providing a substrate which is at least partially covered by a layer of radiation sensitive material;

providing a projection beam of radiation;

using patterning structure to endow the projection beam with a pattern in its cross section;

projecting the patterned beam of radiation onto a target portion of the layer of radiation sensitive material; and

generating an electromagnetic field so as to prevent particles to become incident on an object within said illumination system or said projection system.

24. A device manufactured in accordance with the method of Claim 22.

25. A mask handling device comprising:
a chamber;

a mask contained in said chamber during handling, transportation or storage thereof; said mask having a patterned surface; and

a particle shield that reduces contamination of the patterned surface of said mask by particles.

26. A mask handling device according to claim 24, wherein said particle shield comprises means for generating an electromagnetic field so as to prevent particles to become incident on at least the patterned surface of said mask.

27. A mask handling device according to Claim 25, wherein said particle shield comprises a grid or array of electrodes.

28. A mask handling device according to Claims 25, wherein said particle shield comprises a heater for maintaining said mask at a temperature greater than its surroundings.

29. A mask handling device according to Claim 25, wherein said particle shield comprises a plate disposed proximate said mask and a cooler for maintaining said plate at a temperature less than the temperature of said mask.

30. A mask handling device according to any one of Claim 25, wherein said device is a mask storage box.